# Multihead Hydraulic Swaging Unit (MHSU)

## Setup and Operating Instructions

Up to 1 in./25 mm MHSU with base

1 in./25 mm and over MHSU with base
(also for use with 5/8 and 3/4 in.
SAF 2507™ super duplex fittings
and 3/4 in. medium-pressure tube fittings)

**READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE USING THE MHSU.**

### Definitions

Statements and symbols are used in this document to identify safety concerns. Read the definitions below before setting up and operating the MHSU.

**WARNING**
**Statements that identify conditions or practices that could result in personal injury or loss of life.**

**CAUTION**
**Statements that identify conditions or practices that could result in damage to the equipment or other property.**

### Safety Precautions

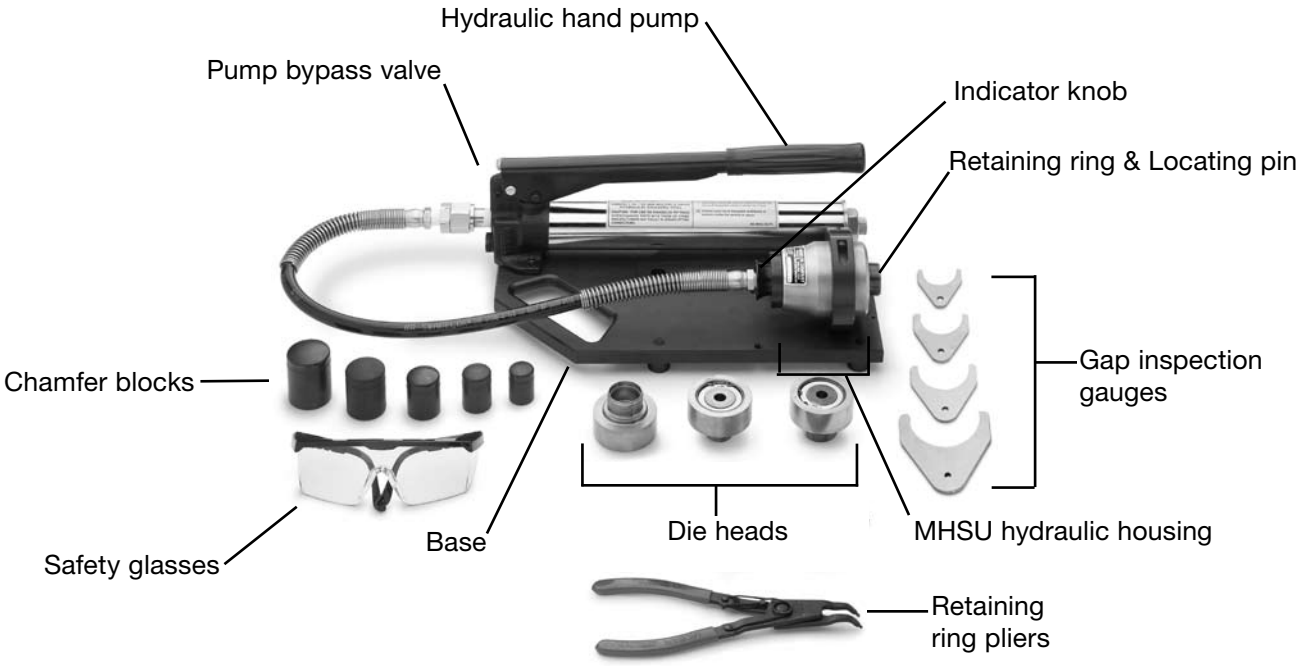
**WARNING, EYE PROTECTION**
**Safety glasses must be worn when setting up and operating the MHSU.**

**CAUTION**
**Do not tamper with or alter any components of the MHSU.**

**WARNING**
**Do not use the MHSU and return the MHSU to your authorized Swagelok representative if any signs of excessive fluid leakage or a malfunction occurs.**

**WARNING**
**Do not use the hand pump after the indicator knob releases. Failure to stop pumping after the indicator knob releases may affect fitting performance.**

## Components (Unit with Body Die Heads and Base)




## Setup

1. Remove the **retaining ring** from the **hydraulic housing** using the **retaining ring pliers**. See Fig. 1.

   **CAUTION**
   **Use caution when releasing the retaining ring from the pliers.**

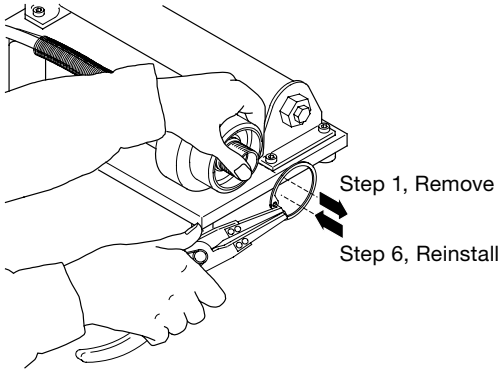



Fig. 1 Retaining Ring Removal / Reinstallation

2. Remove the previously installed **die head** from the **hydraulic housing**. See Fig. 2.
3. Select the appropriate size **die head**.
4. Check the die head piston for movement by depressing the piston before inserting the **die head** into the **hydraulic housing**.

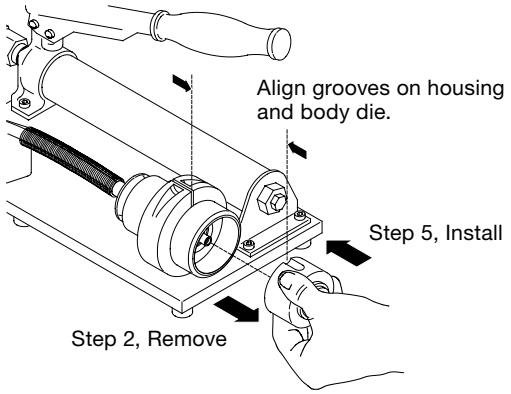



Fig. 2 Body Die Removal / Installation

5. Install the selected **die head** into the **hydraulic housing** and align the notch on the die head with the **locating pin** on the hydraulic housing. See Fig. 2.
6. Reinstall the **retaining ring** into the **hydraulic housing** using the **retaining ring pliers**. See Fig. 1.

   Note: Visually verify that the retaining ring is fully inserted into the hydraulic housing.
7. Refer to the **Recommended Minimum Wall Thickness of Tubing for use with the MHSU** table in the **Troubleshooting** section for information on recommended tubing size.

## Operation

1. Open the **pump bypass valve** by turning the handle counterclockwise at least one-half to one turn. It may be necessary to first close the valve completely by turning the handle clockwise until it stops.
2. Prepare tube ends by deburring or using the Swagelok chamfer block as follows.
   Note: The chamfer block procedure should be followed when using up to and including one inch tubing.
   A. Cut tubing squarely. Use of a Swagelok tube saw guide is recommended.
   B. Remove any burrs. Use of Swagelok tube deburring tools is recommended.

⚠ **WARNING**

**Failure to deburr the OD of the tube could prevent the tube from properly resting against the piston shoulder. ID burrs could break off and cause damage in other components of the system.**

   C. For the up to and including one inch MHSU, use the chamfer blocks provided. Insert cut end of tubing into the chamfer block and while firmly holding the tubing, strike the chamfer block with a hammer to coin the end (as shown on the instruction decal in the MHSU case).
   D. If a file is used on the OD, make a 10° x 0.06 in. (1.5 mm) chamfer.
3. Insert tubing into the Swagelok end fitting to be pre-swaged. Disassemble the nut from the end connection, leaving the nut and ferrules on the tubing. The orientation of the **nut**, **rear ferrule**, and **front ferrule** should be as shown in Fig. 3.

Fig. 3 Nut and Ferrule Orientation

4. Insert the tubing into the die head until it rests firmly against the piston shoulder. Tighten the nut until finger-tight and all die threads are covered by the nut.
5. Push the indicator knob forward until it snaps into place. The **knob shoulder** should be flush with the hydraulic housing. See Fig. 4.

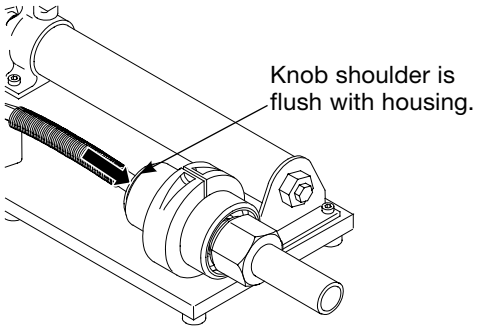



Fig. 4 Indicator Knob in Swaging Position

   Note: If the indicator knob does not snap into place or is not flush with the housing the piston may not be fully retracted. This problem may be caused by the bypass valve being closed or by the piston binding. Do not proceed until unit is functioning properly. Contact your authorized Swagelok sales and service representative for further assistance.
6. Close the pump bypass valve to the finger-tight position by rotating valve handle clockwise until it stops.
7. While holding the tubing against the piston shoulder, increase the hydraulic pressure by using the hand pump until the indicator knob is released.

⚠ **WARNING**

**Do not use the hand pump after the indicator knob releases. Failure to stop pumping after the indicator knob releases may affect fitting performance.**

8. Mark the tubing at the back of the nut.
   Note: This mark will be used later to ensure the nut has been sufficiently hand tightened when assembled to the fitting body.
9. Open the pump bypass valve by turning the handle one-half to one turn counterclockwise.
10. Unthread the Swagelok nut and remove the preswaged assembly from the housing.

11. Inspect the tube end for a radial indentation bottoming mark (see Fig. 5). This indentation indicates the tubing was properly bottomed in the MHSU. If there is not a visible indentation, the preswaged assembly should not be used.

    Note: Depending upon the tube end squareness, the mark may be intermittent.

    Note: The MHSU should only be used to preswage a set of ferrules one time. If the ferrules were insufficiently preswaged, they should be discarded and the process started again with a new set of ferrules.

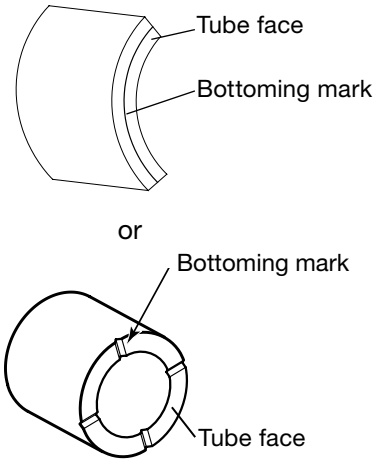



Fig. 5 Tube Bottoming Mark

12. Fittings over 1 in. or 25 mm only: Lubricant must be applied when installing Swagelok tube fittings in these sizes. A packet of lubricant is provided with the fitting.
    Apply the lubricant sparingly to the Swagelok tube fitting body threads. Apply a similar amount of lubricant to the rear surface of the back ferrule.
13. Install the preswaged assembly into the fitting body. Turn the nut onto the fitting body until it is finger-tight. See Fig. 6.

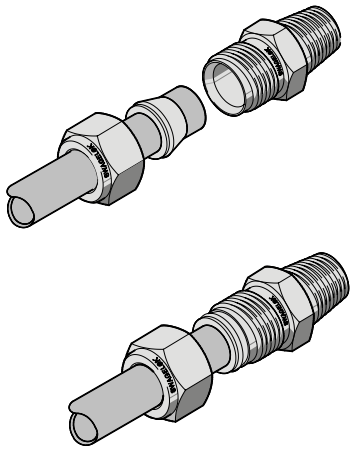


Fig. 6 Installing Preswaged Assembly into Fitting Body

    Note: The line marked on the tubing in step 8 should now be visible. If not visible, tighten the nut with a wrench until the line is visible.

14. 3/4 in. medium-pressure tube fittings: Mark the nut at the 6 o'clock position. Hold the fitting body stable and tighten the nut one-third turn with a wrench. See *Instructions for Swagelok Medium-Pressure Tube Fittings*, MS-CRD-0096, for additional information and alternative installation by torque method.

    All other fittings: Mark the nut at the 6 o'clock position. Hold the fitting body stable and tighten the nut one-half turn with a wrench. See Fig. 7.

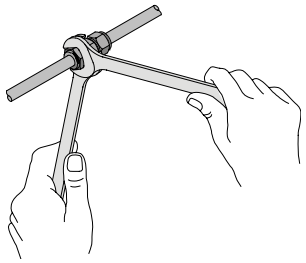


Fig. 7 Tighten Nut with Wrench

**CAUTION**
**Use the Swagelok MHSU gap inspection gauge to ensure the fitting has been sufficiently tightened.**

## Gauging Instructions

Position the Swagelok MHSU gap inspection gauge adjacent to the gap between the nut and body hex. See Fig. 8

- If the gauge **will not** enter the gap, **the fitting is sufficiently tightened.**
- If the gauge **will** enter the gap, **additional tightening is required.**

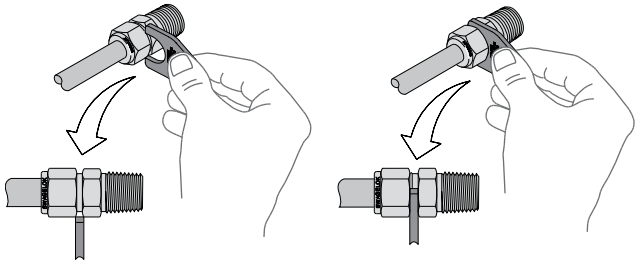
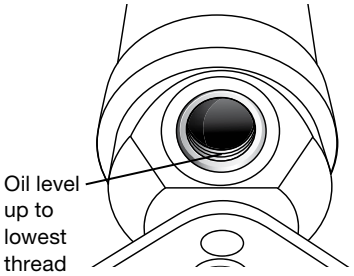


Fig. 8 Using MHSU Gap Inspection Gauge

## Troubleshooting

| Symptom | Cause | Remedy |
|---|---|---|
| Tubing is difficult to remove from the MHSU. | There has been normal tube expansion. | Rock the tubing gently back and forth.<br>⚠ **CAUTION**<br>**Do not rotate the tubing.** |
| | Tube wall thickness may be below the recommended level. | Refer to the **Recommended Minimum Wall Thickness** table. |
| The indicator knob fails to release. | Oil may need to be added | Place the unit on a horizontal surface. Check the oil level, fill to the lowest thread if necessary. It is recommended to use 10W, AW-46 grade hydraulic oil or equivalent with an antifoaming additive.<br>If oil reservoir is full and symptom persists, return the unit to your authorized Swagelok representative.<br>  <br><br>Proper Oil Level |
| The die head piston does not return fully after swaging. | The die head piston may be damaged. | Return the unit to your authorized Swagelok representative. |
| The Swagelok nut does not cover all of the die head threads. | Bypass valve is closed. | Verify the bypass valve is open. |
| | The die head piston is not returning fully after swaging. | Verify the die head piston is not binding in the body die. If there is binding, return the unit to your authorized Swagelok representative. |
| The pump is failing to build pressure. | The oil level is incorrect.<br>Too much or too little oil prevents the pump from working properly. | Add or remove oil as necessary with the unit on a horizontal surface. It is recommended to use 10W, AW-46 grade hydraulic oil or equivalent with an antifoaming additive. |
| There is oil around the pump. | There has been normal wear to the pump components. | A small amount of leakage is acceptable. If oil is dripping or there is a puddle, return the unit to your authorized Swagelok representative. |

## Recommended Minimum Wall Thickness of Tubing for use with the MHSU

**CAUTION**
**Use of tubing below the recommended minimum wall thickness may result in the tube sticking in the die head.**

| Fractional Tubing | | |
|---|---|---|
| **Tooling Size** in. | **Tubing Wall,** in. | |
| | **Steel** | **Stainless Steel** |
| 1/2 | 0.049 | 0.065 |
| 5/8 | 0.065 | |
| 3/4 | | |
| 7/8 | | |
| 1 | | 0.083 |
| 1 1/4 | 0.083 | 0.095 |
| 1 1/2 | | |
| 2 | 0.095 | 0.109 |

| SAF 2507 Super Duplex Fittings |
|---|
| 1/4 through 1/2 in. fittings—not approved for use with MHSU |
| 5/8 and 3/4 in. fittings—use 1 in./25 mm and over MHSU with appropriate 5/8 and 3/4 in. super duplex dies |

| Metric Tubing | | |
|---|---|---|
| **Tooling Size** mm | **Tubing Wall,** mm | |
| | **Steel** | **Stainless Steel** |
| 12 | 1.5 | 1.5 |
| 14 | | |
| 15 | | |
| 16 | | 1.8 |
| 18 | | |
| 20 | 2.0 | 2.0 |
| 22 | | |
| 25 | | |
| 28 | 2.2 | 2.2 |
| 30 | | |
| 32 | | |
| 38 | | 2.5 |
| 50 | | |

| Medium-Pressure Tube Fittings |
|---|
| 1/4 through 9/16 in. fittings—not approved for use with MHSU |
| 6 through 12 mm fittings—not approved for use with the MHSU |
| 3/4 in. fittings—use 1 in./25 mm and over MHSU with appropriate 3/4 in. medium-pressure die |

### Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.

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